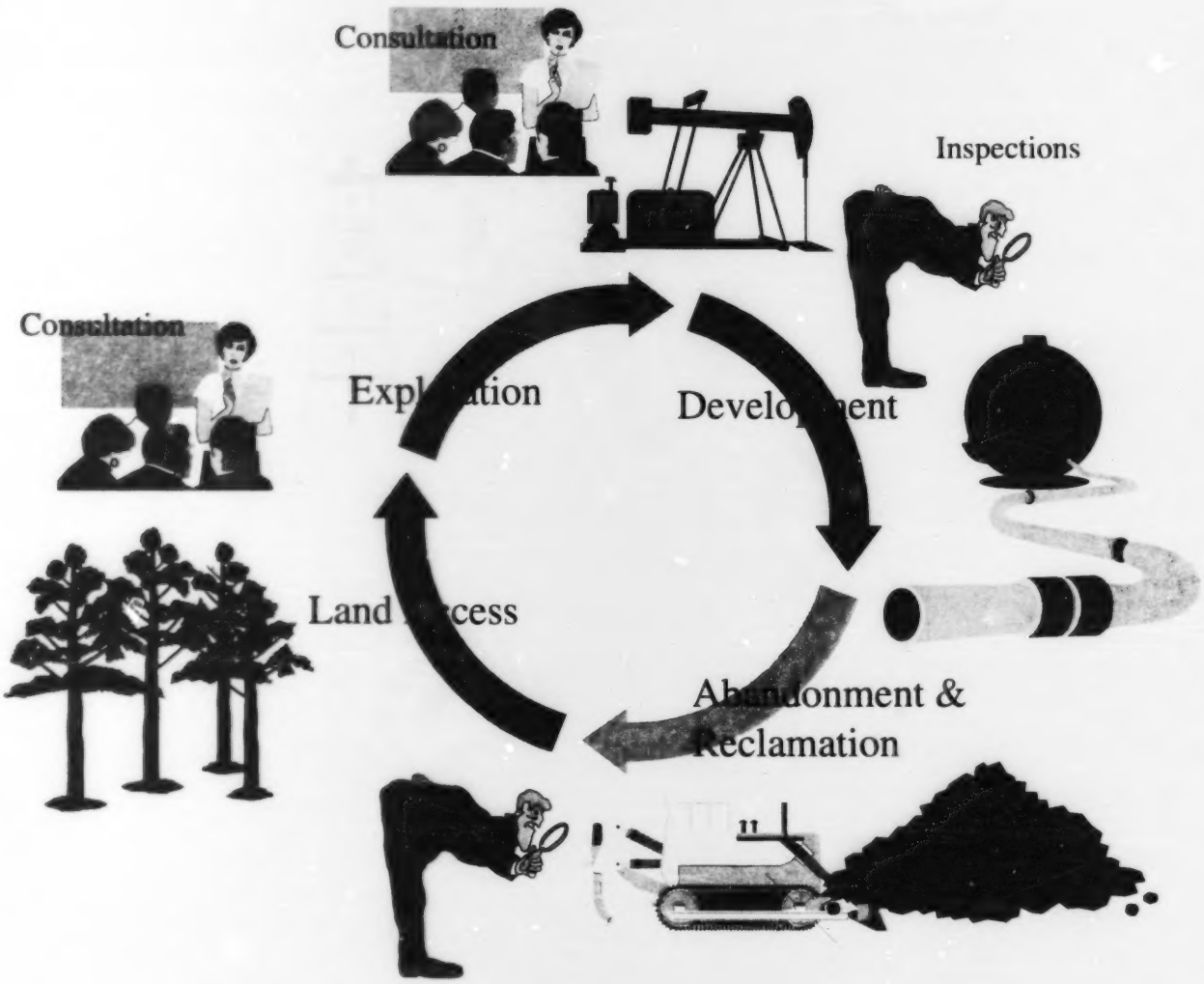
ENVIRONMENTAL REGULATION OF NATURAL GAS DEVELOPMENT IN ALBERTA, CANADA



Alberta
ENERGY

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PREFACE

The report *Environmental Regulation of Natural Gas Development in Alberta, Canada,* was written for an audience who has need of a description of how and why natural gas development in Alberta is regulated for environmental protection. In Alberta, several factors — the pattern of ownership of natural resources, the demand by the public for responsible management of Crown owned natural resources, and the legislative authority for regulation resting with the Province — have compelled development of an effective process for protecting environmental values while at the same time allowing responsible development of mineral resources.

As in other Canadian provinces, the Government of Alberta has constitutional responsibilities related to management of natural resources within its boundaries. These responsibilities flow from Crown (public) ownership of a large majority of both renewable and non-renewable natural resources within the province. This pattern of ownership has compelled development of a policy framework to facilitate decisions concerning the best use of publicly owned natural resources.

The province of Alberta owns the mineral rights underlying about 80 per cent of the lands within its boundaries. While its mineral proprietary rights are restricted to provincially owned resources, Alberta has legislative authority to regulate the development of both publicly and privately owned non-renewable resources. With legislative authority for regulation comes responsibility to ensure that projects are technically safe and environmentally acceptable. Towards this end, Alberta has developed a set of regulatory requirements for petroleum exploration and development that are amongst the most comprehensive and stringent in the world. Alberta has, as of September 1994, 21 pieces of provincial legislation to govern the conduct of industry within an environmental context, 34 sets of accompanying regulations and 84 guidelines governing the energy industry's environmental performance. The province has been successful in clearly communicating the regulatory conditions and expectations which the energy industry must comply with through all stages of natural gas development. This has allowed industry to develop innovative techniques to minimize negative environmental effects. The province is currently streamlining the regulatory processes to minimize duplication and delay while maintaining effective environmental protection.

Alberta has a planning process which attempts to consider all potential resource uses up front in an effort to determine their best future use. Alberta's 20 years of experience with this collaborative multi-stakeholder process has resulted in early identification and resolution of land-use conflicts, in-depth public consultation, and incorporation of environmental values within the decision making process. This process has seen a large amount of land set aside as protected areas or areas with explicit conditions governing development. Alberta's resources management decision making process includes industry consultation with local public, regulatory approvals for facility development, environmental standards for operation, compliance enforcement with clear rules and fines for non-compliance, and requirements for reclamation to pre-existing conditions on completion.

1. EXECUTIVE SUMMARY

In tandem with the growth of the energy industry, Alberta has developed a comprehensive regulatory regime which ensures that the exploration, development and production of natural resources in the province takes place in an environmentally responsible manner. This regulatory regime ensures a reasonable balance between economic and environmental objectives (with a view to sustainable energy development), with the objective of ensuring minimal impact and returning the land to its original state after development. The participation of stakeholders, interested parties and the general public in energy and environmental concerns has enhanced the quality of land and resources management.

The Integrated Resource Management ("IRM") and Integrated Resource Planning ("IRP") processes, the environmental mandate outlined in both the Environmental Protection and Enhancement Act, and the Energy Resources Conservation Act, are all key instruments of environmental protection in Alberta and are discussed in greater detail, in this review.

The primary goal of Integrated Resource Management is to position Alberta for optimal, long-term use of the province's natural resources, thereby maximizing the benefits for Albertans, now and in the future. Integrated resource planning provides a clear framework for land and resource allocation decisions pertaining to public lands and resources throughout the province, and strives to achieve a balance among resource development, conservation and protection, and the maintenance of public lands and resources.

The Alberta Environmental Protection and Enhancement Act (EPEA), which came into force in 1993, was the culmination of a comprehensive examination and streamlining of provincial environmental legislation. EPEA prescribes, among other things, an environmental assessment process which ensures that a reasonable integration of environmental protection and economic decision-making is considered in the early stages of planning. The legislation mandates environmental impact assessment reports for certain natural gas development projects, as part of the EPEA approval process. EPEA also identifies mandatory activities designated as requiring an approval. The Activities Designation Regulation establishes five general categories of activities: (1) waste, (2) substance release, (3) conservation and reclamation, (4) miscellaneous, and (5) potable water. The Act also created the Environmental Appeal Board to hear appeals on statements of concerns filed on approvals issued by other Directors within Environmental Protection.

The jurisdiction of the Alberta Energy and Utilities Board (EUB), formerly the Energy Resources Conservation Board, encompasses the granting of permits, approvals and licences to construct and operate regulated facilities. These approvals are another key process in the framework of environmental regulation in Alberta. The EUB is charged with ensuring that energy development is carried out in an orderly and efficient manner which protects the public interest. Section 2.1 of the Energy Resources Conservation Act states that the Board, in determining whether a proposed project is in the public interest, will consider the environmental, social and economic effects of the proposed development. This quasi-judicial tribunal has the obligation to convene a public hearing "if it appears to the Board that its decision on an application may directly or adversely affect the rights of a person" (s. 29 (2) Energy Resources Conservation Act). Funding is available to help defray some costs associated with intervenor participation in the hearing process. In addition to the general powers outlined in the Board's enabling legislation, the Energy Resources Conservation Act, the Board derives further specific powers and jurisdiction over areas of natural gas development from the Oil and Gas Conservation Act and the Pipeline Act.

The EUB, the Alberta Department of Energy (ADOE), the Department of Environmental Protection (AEP) and the Department of Agriculture, Food and Rural Development each have a role in the

regulation of energy industry activities, including pre-drilling, drilling, production and processing, suspension, abandonment, decommissioning and reclamation of natural gas facilities in the province. Each has established comprehensive procedures to safeguard the orderly management and environmentally sensitive development of Alberta's oil and gas reserves. The breadth and depth of environmental regulation administered by the EUB, the ADOE and AEP are outlined and discussed in greater detail in this review.

This document provides an overview of the environmental regulation of natural gas development in Alberta and discusses the responsibilities of the EUB, AEP and the ADOE, in managing the process.[1] The overall system is characterized by:

- being strongly consultative (which provides for an early identification of land-use conflicts and generally avoids litigations),
- provides clarity of rules and expectations throughout the development cycle (exploration to reclamation) which allows industry to use their innovation to comply,
- the regulatory framework is comprehensive and rigorous, but is currently undergoing review to ensure there is no duplication and that all regulations are still needed,
- ensures a reasonable balance between economic and environmental objectives (with a view to sustainable energy development)
- EUB and AEP inspectors are active in monitoring field operations and ensure compliance with conditions of approval and other regulatory requirements.

2. INTRODUCTION

The exploration, production, processing, transmission, and sale of natural gas and natural gas by-products are major industries within Alberta, requiring a comprehensive infrastructure of wells, pipelines, batteries, processing plants, and other related facilities.

To date, over 35,000 completed gas wells have been drilled, 149,000 kilometers (92,990 miles) of gas pipeline and 8,000 kilometers (4,990 miles) of natural gas liquids pipeline, have been constructed and 703 processing plants have been built in Alberta (Table 1).

TABLE 1
OIL AND GAS FACILITIES IN ALBERTA (1994)

Facility Type	*Quantities*
Wells	
Capable oil wells	37,500
Capable gas wells	35,000
Capped gas wells	8,000
Injection and disposal wells	8,500
Abandoned and other wells	85,700
Total	**174,700**
Facilities	
Gas processing plants (sweet gas)	429
Gas processing plants (sour gas)	274
Oil sands processing plants	14
Oil refineries	5
Total	**722**
Pipelines (km)	
Gas pipelines	149,000 (92,990 miles)
Oil pipelines	67,100 (41,875 miles)
Other pipelines	20,300 (12,670 miles)
Total	**236,400 (147,535 miles)**
Rural gas distribution	100,000 (62,415 miles)

In 1994, the level of drilling in Alberta was sufficient to add 74.2 billion cubic meters (2.6 trillion cubic feet — Tcf) of natural gas to initial established reserves (Energy and Utilities Board, 1994). Remaining natural gas reserves of 1,490 billion cubic metres (53 Tcf) are still available in Alberta, sufficient for 12.5 years at the current rate of production.

[1] Acknowledgments: Thanks are extended to staff of Alberta Environmental Protection and Alberta Energy and Utilities Board for their assistance in ensuring the accuracy of this document.

Excluding natural gas by-products, such as sulphur and natural gas liquids (ethane, propane, butane, pentane), natural gas sales reached 114.4 billion cubic meters (4.03 Tcf) in 1994. Approximately 18.1 billion cubic meters (0.6 Tcf) of natural gas were consumed in Alberta (16%), 31.8 billion cubic meters (1.1 Tcf) of Alberta natural gas were consumed in the rest of Canada (28%), and 64.5 billion cubic metres (2.3 Tcf) were exported to U.S. markets (56%). Natural gas is, in some instances, also produced as a by-product from crude oil wells. A more complete discussion of natural gas supply and competitiveness can be found in a publication put out by the Canadian Association of Petroleum Producers, entitled "Reliability and Competitiveness of Canadian Natural Gas — Discussion Paper (see reference) — 1995a."

Environmental regulation covers the full spectrum of natural gas development activities. The regulatory regime is primarily administered under the aegis of the Department of Environmental Protection (AEP), the Alberta Department of Agriculture, Food and Rural Development (ADAFRD) the Alberta Department of Energy (ADOE) and the Alberta Energy and Utilities Board (EUB), formerly the Energy Resources Conservation Board. Each organization plays a distinct, legislated role in each stage of development (including pre-drilling, drilling, production and processing facilities, suspension, abandonment, decommissioning and reclamation of natural gas facilities in the province, (see Table 2) while avoiding unnecessary duplication.

The Alberta government believes that natural resources must be developed in both an economically and environmentally responsible manner. Recognizing that there may be competing uses and requirements for provincial land and resources, Alberta allows natural resources exploration and development to occur only where it is demonstrated that the potential environmental impacts are slight or impacts can be satisfactorily mitigated. Stakeholder input is a vitally important component of this decision-making process.

The following review outlines the provincial policy and regulatory regime designed to address the potential environmental impacts associated with energy facilities and activities such as natural gas exploration, production and processing. This review encompasses a detailed description of the environmental considerations undertaken at each stage of the development cycle of natural gas and the administration of this process by the EUB, AEP, ADAFRD, and ADOE. Additional federal government requirements must also be complied with (Natural Resources Canada, 1994; CAPP, 1995b), but are not dealt with in this review.

TABLE 2

NATURAL GAS DEVELOPMENT ACTIVITIES AND REGULATORY AUTHORITIES

Development Activity		***Regulatory Authority***
Pre-Drilling & Exploration	1. Seismic a. Licence to explore b. Permit to operate equipment 2. Mineral exploration a. Licence to explore b. Permit to operate equipment 3. Access	1. Seismic a. Alberta Environmental Protection (AEP some restrictions may apply. b. AEP issues permits to contractors 2. Mineral Exploration a. AEP must approve program — conditions may apply b. AEP issues permits to contractors 3. Access: a. varies depending upon jurisdiction and ownership
Mineral Rights Disposition	1. Mineral rights a. Crown b. Private	1. Mineral Rights a. Alberta Department of Energy (ADOE) — Crown mineral agreements issued under Mines and Minerals Act, but must have approval of AEP Chair of CMDRC b. Mineral rights agreements acquired through negotiations and legal contract with owner
Drilling	1. Acquire surface rights a. Public land b. Private land 2. Well-site a. Site selection b. Licencing c. Casing & cement d. Hydrogen sulfide review e. Drilling & waste disposal f. Surveillance & compliance	1. Acquire Surface Rights a. AEP/Agriculture, Food and Rural Development (AFRD) must all approve, usually with conditions b. Negotiations and legal contract with land owner (may involve Surface Rights Board) 2. Well-site a. Applicant/EUB/AEP b. EUB, also possibly AEP c. EUB d. EUB e. EUB/AEP/AFRD/industry f. EUB/AEP
Development & Production	1. Field activity 2. Technical 3 Rights management 4. Revenue collection 5. Environmental regulation	1. EUB/AEP/AFRD 2. EUB (Oil & Gas Conservation Act) 3. ADOE (Mines & Minerals Act)/EUB (Oil & Gas Conservation Act) 4. ADOE (Mines & Minerals Act) 5. EUB/AEP
Gathering, Processing & Transportation	1. Acquire surface rights 2. Approvals and licencing 3. Field regulation 4. Environmental regulations 5. Municipal approvals 6. Trade & export regulations 7. Utility infrastructure	1. Exactly as in "Drilling" section 2. EUB/AEP 3. EUB regulations 4. EUB/AEP 5. Municipalities, County or Improvement District 6. National Energy Board (Federal) 7. EUB/AEP/Municipal Governments
Well or Project Abandonment	1. Physical abandonment 2. Reclamation 3. Reclamation certificate	1. EUB 2. AEP/AFRD 3. Local land reclamation officer (AEP/AFRD)

3. ENVIRONMENTAL POLICY AND REGULATORY FRAMEWORK

Before outlining the environmental compliance requirements imposed on parties proposing to engage in the exploration and development of natural gas, it is useful to examine some of the guiding principles and broad framework of environmental protection in Alberta. This environmental protection is undertaken through three broad mechanisms: (1) government policy initiatives, (2) provincial government legislation, and (3) the Alberta Energy and Utilities Board (EUB) approvals process.

As stated earlier, the Alberta government recognizes that there are multiple uses for the province's land base and that the development of hydrocarbon reserves is but one potential use. In developing the provincial environmental legislation, a key consideration was the ability to assess potential environmental impacts early in the planning process and prior to development. This goal is facilitated by prompt communication of information to the public and the early involvement of affected parties in the decision-making processes. Alberta has also sought to ensure an efficient and streamlined regulatory regime to avoid unnecessary duplication. These principles are embodied in the governing Alberta legislation:

- the Environmental Protection and Enhancement Act (S.A. 1992, c.E-13.3);
- the Public Lands Act (R.S.A. 1980 c. P-30) which enables the Integrated Resources Planning process and the various EUB approval processes authorized primarily by the Energy Resources Conservation Act (R.S.A. 1980 C. E-11);
- the Oil and Gas Conservation Act (R.S.A. 1980 C. 0.5) and the Pipeline Act (R.S.A. 1980 C. P-8).

Each of these integral components of environmental protection in Alberta is discussed in the following chapters. Copies of each of these acts can be obtained through Queen's Printer Bookstore, Public Affairs Bureau, 11510 Kingsway Avenue, Edmonton, Alberta, Canada, T5G 2Y5.

3.1 Policy Framework

3.1.1 Government Performance Measurement

The Alberta Government's three core businesses are: people, prosperity and preservation (Alberta Government, 1995a). A set of measures has been defined to track progress within these core businesses. In the context of natural gas development, a "resource sustainability" index has been developed which tracks five-year replacement of gas production. A complementary indicator measures the total level of air emissions in Alberta per 1000 square kilometres.

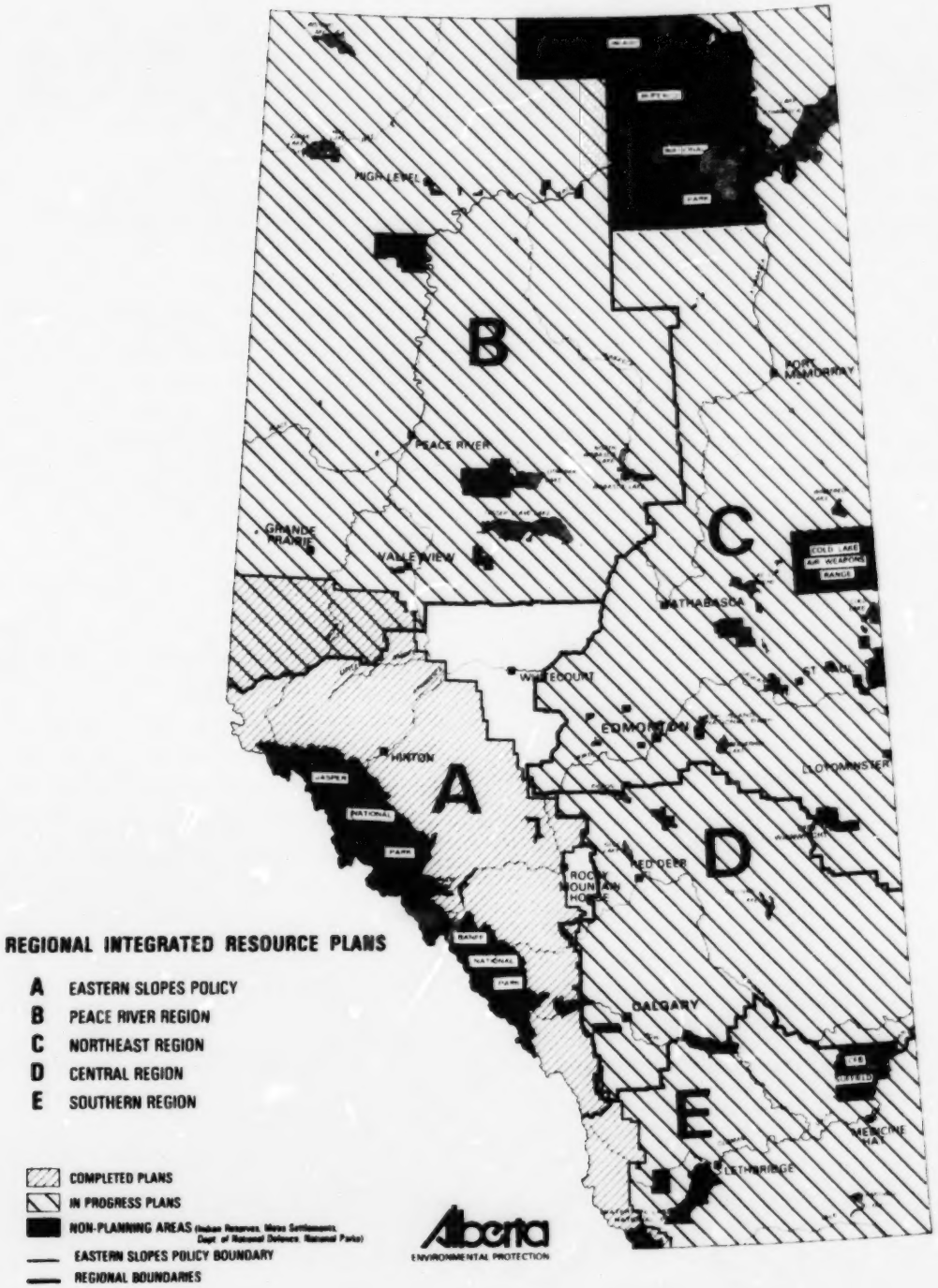
3.1.2 The Integrated Resource Management Process

Land use and natural resource activities are guided by Alberta's Integrated Resource Management (IRM) philosophy and associated Integrated Resource Planning (IRP) program. Alberta adopted IRM to provide for the most beneficial use of provincial land and resources, while ensuring resource conservation. IRM recognizes that the management and use of one resource can affect the management and use of another. The overall intent of IRM is to use provincial natural resources to achieve the best overall benefits for Albertans now and in the future.

In the 1970s, the competing demands of resource development and conservation in the Eastern Slopes region of the Canadian Rocky Mountains, prompted the Alberta Government to hold public hearings. These hearings resulted in a "Policy for Resource Management of the Eastern Slopes" (Alberta Government, 1977, 1984-ESP). The Eastern Slopes Policy (ESP) was adopted in 1977 and revised in 1984 (Figure 1). The Policy embodies the principles of integrated resource planning, designed to balance resource development, management and protection.

The most significant aspect of this Policy is the zoning framework, which recognizes eight categories of zones, ranging from Prime Protection (Zone 1) to Facility Development (Zone 8). Zoning has been, and

FIGURE 1


HIGH LEVEL
B
PEACE RIVER
GRANDE PRAIRIE
WALLEYVIEW
FORT MCMURRAY
C
COLD LAKE AIR WEAPONS RANGE
ATHABASCA
WHITECOURT
EDMONTON
HINTON
A
JASPER NATIONAL PARK
BANFF NATIONAL PARK
ROCKY MOUNTAIN HOUSE
RED DEER
D
LLOYDMINSTER
CALGARY
E
MEDICINE HAT
LETHBRIDGE
REGIONAL INTEGRATED RESOURCE PLANS
A EASTERN SLOPES POLICY
B PEACE RIVER REGION
C NORTHEAST REGION
D CENTRAL REGION
E SOUTHERN REGION
COMPLETED PLANS
IN PROGRESS PLANS
NON-PLANNING AREAS (Indian Reserves, Metis Settlements, Dept. of National Defence, National Parks)
EASTERN SLOPES POLICY BOUNDARY
REGIONAL BOUNDARIES
Alberta
ENVIRONMENTAL PROTECTION

continues to be, an effective tool for resolving land use conflicts, allocating land and resources for different uses, and communicating the government's policy on current and future management of public land and resources.

With the approval of the ESP, Alberta established the Integrated Resource Planning (IRP) program, to guide the management and allocation of Alberta's public land and resources (Alberta Forestry, Lands and Wildlife, 1991). The IRP process identifies, assesses and compares all resource values within a planning area in making decisions about the use of public land and resources.

The IRPs are developed through the cooperative efforts of provincial government agencies responsible for the management or use of natural resources, including energy, fish and wildlife, forestry and agriculture resources and parks and natural areas.

The IRP process involves gathering information on natural resources, land use activities and resource management issues, and considers the views of interested government departments, municipal authorities, planning commissions, the federal government, industry, aboriginal peoples, public interest groups and the general public. The IRP process allows the government to identify concerns or interests which should be acknowledged in zoning decisions, in an effort to achieve:

- balance among resources protection, conservation and development, and
- the maintenance of public land and resources for the future.

Integrated resource plans are developed at three levels: regional, sub-regional and local. Regional IRPs link provincial policies for resource management to more detailed decisions concerning land use priorities and decisions. Sub-regional IRPs entail a more detailed assessment of resource management issues and provide resource priority and allocation direction designed to achieve an optimal mix of benefits. Local IRPs apply to smaller geographic areas and address specific resource management issues.

The IRP process consists of five phases:

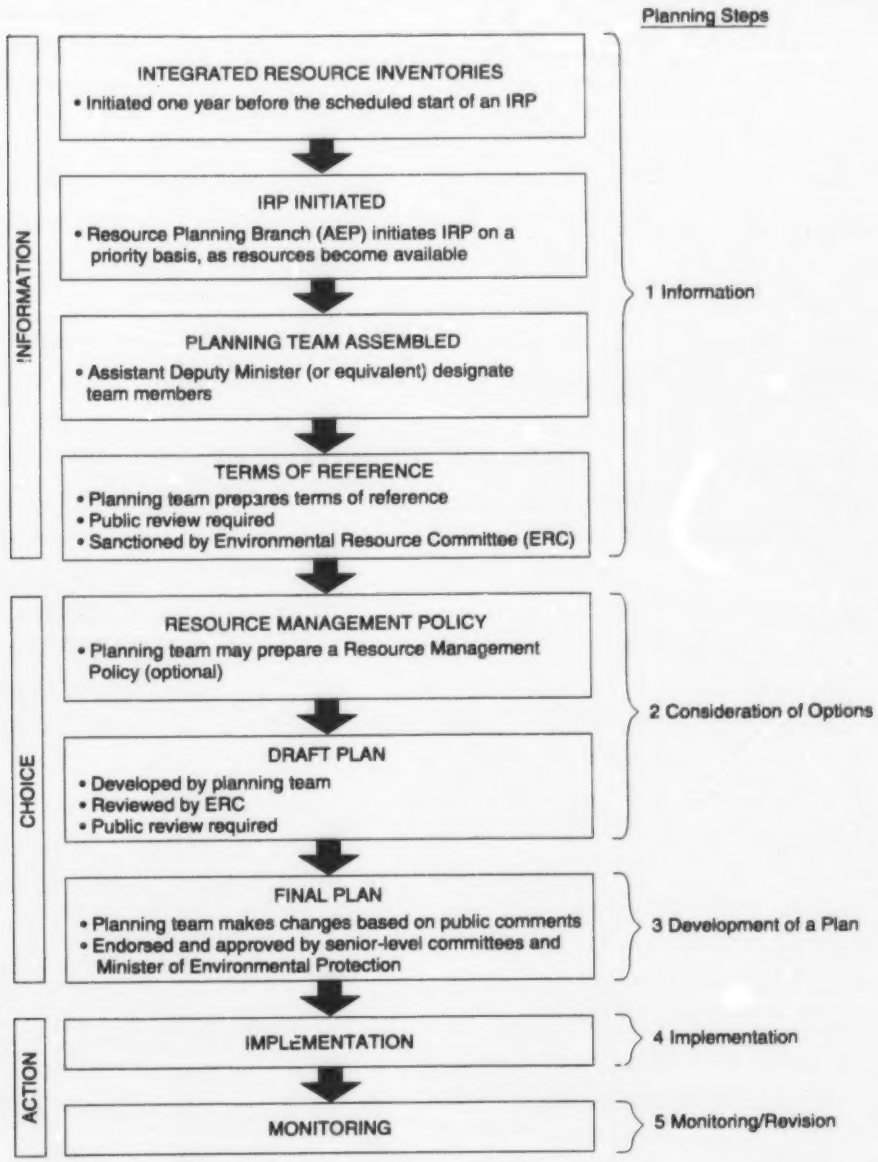
1. Information gathering
2. Consideration of options
3. Development of a plan (including land allocation (zoning) decisions, obligations, use guidelines, etc.)
4. Implementation of the plan
5. Monitoring and revision

There are opportunities for public involvement during each of these phases and efforts are under way to improve this involvement. In the information-gathering phase, the public and other interested stakeholders are invited to participate in the development of the terms of reference for the IRP by identifying issues and conflicts that should be addressed in the plan. During the drafting of the plan, the public is consulted to elicit their views on the land allocation zoning and policy direction proposed in the draft plan (Figure 2).

AEP typically reviews each completed IRP every five years, or sooner if warranted, to assess its continued relevance and effectiveness. The IRP program itself is subject to periodic review in order to gauge its continued effectiveness (Alberta Forestry, Lands and Wildlife, 1992). Stakeholders and interested parties who participated in the development of the plan are invited to provide their views on how well the plan is working and whether any new issues have been identified which may warrant an amendment to the plan. Requests for amendments to a plan can be initiated by government agencies, industry applicants, special interest groups or the general public. The IRP amendment process includes public consultation to ensure that the public has the opportunity to comment on proposed changes before decisions are made.

All IRPs are approved by the Alberta Cabinet, except for the smaller, local IRPs, which are approved by the Minister of Environmental Protection and those ministers whose departments participated in the development of the plan. There are currently 29 plans in place throughout Alberta. The regulatory process relies on direction outlined by

FIGURE 2
OVERVIEW OF THE INTEGRATED RESOURCE PLANNING PROCESS


Planning Steps
INFORMATION
INTEGRATED RESOURCE INVENTORIES
• Initiated one year before the scheduled start of an IRP
IRP INITIATED
• Resource Planning Branch (AEP) initiates IRP on a priority basis, as resources become available
PLANNING TEAM ASSEMBLED
• Assistant Deputy Minister (or equivalent) designate team members
TERMS OF REFERENCE
• Planning team prepares terms of reference
• Public review required
• Sanctioned by Environmental Resource Committee (ERC)
1 Information
CHOICE
RESOURCE MANAGEMENT POLICY
• Planning team may prepare a Resource Management Policy (optional)
DRAFT PLAN
• Developed by planning team
• Reviewed by ERC
• Public review required
2 Consideration of Options
FINAL PLAN
• Planning team makes changes based on public comments
• Endorsed and approved by senior-level committees and Minister of Environmental Protection
3 Development of a Plan
ACTION
IMPLEMENTATION
4 Implementation
MONITORING
5 Monitoring/Revision

the plans. Proposed land use activities are reviewed under the directions contained in the relevant plan and are determined to be compatible, permissible under conditions, or incompatible with the approved land-use zoning. Compatible or permissible activities must comply with special management guidelines contained in the plan.

Additionally, there are other preservation programs in place in Alberta which are considered in IRP development, including: Special Places 2000 (Alberta Government, 1995b) and the Canadian Heritage Rivers System.

Oil and gas exploration and development is one of many activities factored into the development of

IRPs. Each IRP has smaller regions where natural gas related activities are permitted (with guidelines and restrictions) or not permitted. For the gas explorationist, IRPs form a framework which guides where surface access (and to some extent sub-surface mineral leases) can be acquired and provides operating conditions when access is permitted.

3.2 The Legislative Framework

3.2.1 The Environmental Protection and Enhancement Act

The primary environmental legislative enactment in Alberta is by the Environmental Protection and Enhancement Act ("EPEA"). It was the culmination of a joint government and stakeholder effort to streamline and consolidate nine statutes dealing with environmental regulation into a single legislative enactment.

The stated purposes of EPEA includes promoting and protecting the wise use of the environment, recognizing sustainable development, and preventing or mitigating environmental impacts (EPEA section 2). Under EPEA, a single approval is issued covering authorization to construct, operate or decommission EPEA-regulated activities. EPEA also contains a broad range of measures designed to ensure the timely and effective enforcement of environmental regulations.

Another key EPEA provision is the environmental impact assessment (EIA) process which provides an opportunity for full public participation. The EIA process is triggered when a proponent, government department, local authority or other informs Alberta Environmental Protection (AEP) of a new project. The Environment Assessment Regulation outlines "mandatory activities" for which an EIA is required and, "exempted activities" for which no EIA is required. A third category of activities, not falling within either "mandatory" or "exempted" activities, may be subject to an EIA at the discretion of the Director of Environmental Assessment. For large projects which meet specific criteria, such as sour gas processing plants which will emit more than 2.8 tonnes of sulphur per day, an EIA report is mandatory. Exempt activities are generally those that have minimal environmental impact or where impacts are well known and an EIA is not required. The location, site and nature of the project are reviewed to determine whether such an assessment is necessary. An EIA report will generally include a description of the potential positive and negative environmental impacts of the project as well as plans to mitigate potential adverse impacts and to respond to potential emergencies.

Opportunities for public involvement in the Environmental Assessment Process arise when:

- public notice is given that a proposed project is being screened and an Environmental Impact Assessment report is required;
- public input is sought concerning the terms of reference of an Environmental Impact Assessment report, and;
- information, including AEP screening and Environmental Impact Assessment reports, is made publicly available through a central registry.

The EIA report may also be subject to further public scrutiny as part of a proponent's application for approvals before the Alberta Energy and Utilities Board (EUB).

Certain project-specific approvals may also be required under EPEA. These specific approvals replace the Clean Air Licence, Clean Water Licence, Permit to Construct and the Development and Reclamation approvals previously required under other legislation prior to enactment of EPEA. These approvals address permitted levels of air and water emissions and require construction plans that incorporate final reclamation procedures.

The regulations require that the project proponent file substantial information as part of its application (EPEA s.63 and associated regulations).

Information requirements include:

- Nature of the proposed activity

- Amount and source of each substance to be released into the environment
- Justification for the release
- Measures intended to minimize waste
- Impacts that may result from the activity
- Emergency and contingency response plans
- Public consultation undertaken or proposed

An application initiates the following process:

- When a proposal is submitted, the proponent must provide public notice of the application unless the notice requirement is waived by the Director, and any party directly affected by a proposed project may submit a written "statement of concern" to the Director.
- In cases where an EIA report is required, the Director in reviewing the application will ensure that the Environmental Assessment Process has been completed and that the results of any related public hearings have been taken into consideration.
- Based on a review of the completed application, the Director decides whether or not to issue an approval. If an approval is issued, it contains terms and conditions, specific to that project, for purposes of environmental protection.
- EPEA allows those who submitted statements of concern and/or are directly affected parties to appeal a decision of the Director to the Environmental Appeal Board.
- After hearing an appeal, the Environmental Appeal Board makes recommendations to the Minister of Environmental Protection, who then renders the final decision on whether to confirm, vary or reverse the original decision. In order to ensure access to the appeal process, EPEA provides that parties to an appeal may apply to the Environmental Appeal Board for payment of their costs on appeal.

While the Director has the discretion of whether or not to approve a project, EPEA requires that the Director consider all the criteria outlined in the regulations. The statutory considerations include:

- Impact on the environment of the activity
- Proposed methods of waste minimization Design plans and specifications Suitability of the site
- Proposed monitoring program
- Management, treatment, storage and disposal of substances
- Impacts on potable water
- Plans for conservation and reclamation
- Past performance record of the applicant

Once the operator has abandoned a facility, EPEA states that the operator must reclaim the site and obtain a reclamation certificate. Criteria for reclamation are developed jointly by government departments, industry and public stakeholder groups. When an application for a certificate is made, an inquiry is held on the site to determine if reclamation criteria have been met. Both industry and the landowner are invited to participate in the inquiry so that their input can be taken into account in the decision. On private land, an inspector appointed by the local municipality is also present at the inquiry in order to represent municipal interests in the quality of the site reclamation.

There are several other pieces of Alberta Government legislation which, to a lesser degree, govern natural gas exploration and development activities related to the environment, including:

- Public Lands Act
- Mines and Minerals Act

3.3 The Alberta Energy and Utilities Board (EUB) Approvals Process

All aspects of the natural gas producing industry, from drilling onward, require the approval of and are regulated by the EUB. The Energy Resources Conservation Act (ERC) resulted in the creation in 1938 of the original Energy Resources Conservation Board (now called the Alberta Energy and Utilities

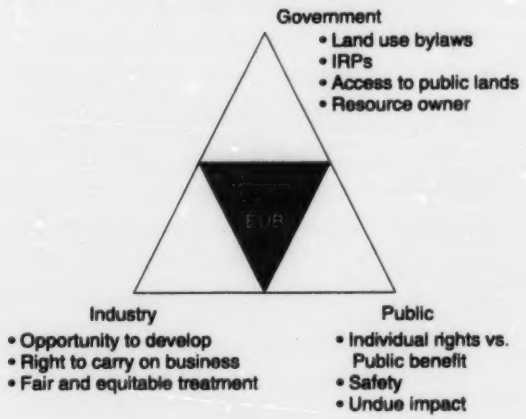
Board — EUB). This quasi-judicial, and independent board has the mission to .....*"ensure that development of Alberta's energy resources take place in a responsible manner in the interests of Albertans."* The core functions of the EUB, as set out in the ERC Act are to:

- provide for the appraisal of reserves and productivity capacity
- provide for the appraisal of energy resource requirements
- effect the conservation of and prevent the waste of, Alberta's energy resources
- control pollution and ensure environmental conservation
- secure the observance of safe and efficient practices
- provide for the recording and timely and useful dissemination of information
- provide agencies from which the Government of Alberta may receive information, advice and recommendations
- in reviewing any application for a proposed energy resource project, give consideration to whether the project is in the public interest having regard to its social and economic effects and its effects on the environment.

In addition, the EUB derives regulatory authority specific to the upstream natural gas industry from the Oil and Gas Conservation Act and the Pipeline Act. Before an operator may construct any of the types of facilities regulated by the EUB, the operator must obtain the necessary permit, approval or licence from the EUB. The EUB is obligated by reason of section 29(2) of the Energy Resources Conservation Act to provide potentially adversely affected persons and directly affected persons with the opportunity for a public hearing of issues or concerns within its mandate. As a quasi-judicial body, the EUB is bound by the rules of natural justice, substantially codified in section 29 of the Act, which gives affected parties a fair opportunity to understand the case and to be heard.

The EUB encourages public involvement by requiring project proponents to disclose information on their projects to the local community before the EUB considers the project and to include interested "publics" in the project development stage. The EUB also pioneered local intervenor funding in Alberta, by which a proponent is required to provide funds to local, potentially affected parties, sufficient to cover intervener's reasonable costs in assembling a solid technical and legal argument on projects before the EUB. The EUB fulfills a role that attempts to balance the rights and interests of the public, industry and the government (Figure 3).

FIGURE 3
ROLE OF THE EUB IN BALANCING RIGHTS AND INTERESTS



By way of its regulations, directives and guides, the EUB sets out information requirements and standards for applications for approval of wells, pipelines and processing plants. In order to be considered for approval, applications must contain sufficient information to enable the EUB to determine if the project is in the public interest. The information required in an application may vary in type and level of detail depending on the potential impacts of a proposed development, this being closely linked to the environmental sensitivity of the affected area (EUB, 1995).

3.4 Summary

Collectively, the policy, legislative and EUB approvals process in Alberta forms a comprehensive regulatory framework that consists of up to 40 potential approvals, permits or licences which may be required (Table 3). The overall system is strongly consultative, provides clarity of rules and expectations throughout the development cycle, and ensures through the EUB approval process that industry's proposed development activities comply with all regulatory requirements and that affected parties have an opportunity for input to the decision-making process. The regulatory framework is comprehensive and rigorous, but is currently undergoing review to ensure there is no duplication and that all regulations are still needed; and ensures a reasonable balance between economic and environmental objectives (with a view to sustainable energy development).

TABLE 3

APPROVALS, PERMITS & LICENCES POTENTIALLY REQUIRED FOR OIL & GAS DEVELOPMENT IN ALBERTA (CAPP, 1988)

AEP — Alberta Environmental Protection
EUB — Alberta Energy and Utilities Board
AFLW — Alberta Forests, Lands and Wildlife (a Division of AEP)

Approvals, Permits & Licences	Development Activity									
	Exploration	Drilling	Production	Pipelines	Power Lines	In Situ	Access Roads	Stream Crossings	Borrow Pits	Camps
EUB Approvals/Licences										
Permit to Construct/Licence to Operate			●	●	●	●				
Well Licence		●				●				
Abandonment of a Well or Formation		●	●							
Application to Report Production			●							
Notice of Commencement/Suspension of Production			●							
Production Spacing Unit		●	●							
Flaring of Sour Gas		●	●	●						
Gas Processing			●							
Plugging Back a Well		●								
Resume Drilling Operations		●								
Suspend Drilling Operations		●								
Surface Rights (AEP — Forestry, Lands & Wildlife)	●	●	●	●	●		●	●	●	
IEI							●			
Licence of Occupation (LOC)		●	●			●	●		●	
Mineral Surface Lease (MSL)				●						
Pipeline Installation Lease (PIL)				●						
Pipeline Lease Agreement			●							
Miscellaneous Lease (Gas Plant)		●	●	●						●
Miscellaneous Permit		●	●	●				●	●	
Surface Materials Licence/Lease (SMC)					●					
Easements		●	●	●	●	●				
Surface Rights Board — Right of Entry	●								●	
Exploration Approval/Licence (AEP-AFLW)					●					
Tree Freeing Authority (AEP-AFLW)	●	●	●	●	●		●		●	●
Burning Permit (AEP-AFLW)	●	●	●	●		●	●		●	●
Reclamation Certificate (AEP-AFLW)				●		●			●	
Development & Reclamation Approval (AEP-AFLW)										
Water Resources (AEP)		●	●	●					●	●
Licence to Divert Water		●	●	●		●	●	●	●	
Drainage Licence		●	●	●			●	●	●	
Permit to Construct Works Near or Across Streams						●			●	
Permit for Exploration (groundwater wells)		●	●	●						●
Groundwater Well Registration (for domestic use)		●	●	●	●	●	●	●	●	●
Pesticides & Herbicides Permit (AEP)		●	●	●	●	●	●		●	●
Historical Resource Permit (Community Development)				●			●	●		
Navigational Permit (Transport Canada — Federal)	●			●	●		●			
Crossings (Pipeline, Roads, Transmission Lines)	●	●	●	●		●	●			
Road Use Agreements, Land Withdrawals	●	●	●	●		●				
Letters of Notification to Municipal Governments (counties, MDs, & IDs)	●	●	●	●	●	●	●		●	●
Letter of Notification — Trappers										

4. PRE-DRILLING EXPLORATION

4.1 Seismic Programs

On private lands, landowner approval must be obtained to gain access for seismic programs. On public lands, the responsibility for regulating seismic programs reposes primarily with Alberta Environmental Protection (AEP). Any party wishing to conduct seismic operations on public land must apply to the Minister of Environmental Protection for an exploration licence or permit (Table 2). The application must include a map which indicates, among other things, the extent to which the program is to be conducted in the White Area (agricultural or settled) and Green Area (forested) of the province. The licensee for a program of exploration, located in whole or in part on public lands in the White Area, must notify the Public Lands Management Branch and the District Public Lands Officer of Agriculture, Food and Rural Development (AFRD) prior to the start of field operations. Similarly, the licensee for a program of exploration, to take place in whole or in part on public lands in the Green Area, must notify the senior forest officer of the Land and Forest Services of AEP, for each ranger district affected by the program of exploration.

The forest officers and public lands officers review the program of exploration to determine whether the application meets the stated environmental and ecological operating conditions and to ensure appropriate site reclamation procedures. Environmental considerations can include: the prevention of irreparable surface disturbances, the prevention of unnecessary reductions of timber resource, the minimization of harassment to wildlife and deterioration of wildlife habitat, the prevention of disturbances to spawning rivers at key periods, the prevention of disruptions to groundwater flows and operational restrictions in areas of well problems.

A program of exploration and drilling can be disallowed for environmental reasons, as in the case of any programs proposed for Zone 1 (Prime Protection) areas of the province. Zone 1 development is not permitted unless the proposal constitutes a "step-out" application as provided for in the Eastern Slopes Policy. The Eastern Slopes Policy has a grandfathering clause which stipulates that the government must honor pre-existing legal commitments to lessees and recognizes that gas or oil pools discovered before implementation of the Eastern Slopes Policy in 1977 may require subsequent development and access. The Alberta Department of Energy (ADOE) has reviewed 48 such applications for seismic programs in Zone 1 over the last five years. Of these, 34 were rejected as not being within the provisions of the "step-out" clause.

5. MINERAL RIGHTS DISPOSITIONS

5.1 Acquiring Mineral Rights

5.1.1 Crown Owned Mineral Rights

Most natural gas "mineral resources" in the province are owned by the Crown. Orderly management and development of Alberta's oil and gas reserves are essential, not only for the continued viability of the non-renewable resource industries and their substantial contribution to the provincial economy, but also to ensure that such development results in minimal environmental impact.

This general duty to manage and promote resource development in the public interest is found in the Mines and Minerals Act (R.S.A. 1980, c.M-15). The exploration for, and development of, Crown reserves of natural gas is performed by private companies that have obtained exclusive mineral rights through a tenure agreement from the Government of Alberta through the Minerals Tenure Branch of the Alberta Department of Energy (ADOE). The granting of mineral rights is accomplished through a competitive bidding process. For methods of exploration other than drilling (i.e., seismic survey techniques), "conveying surface rights" is required to provide a competitive environment for information-gathering prior to acquisition of a tenure agreement. A tenure agreement is required at the point at which drilling is needed to further evaluate a prospect.

The ADOE is aware that in certain areas a number of land uses may exist which are not compatible with natural gas development. To avoid conflicts, restrictions on approximately 1000 standardized township maps have been identified in a Restricted Areas Book. Each page contains a template of four townships on which any designated protected area, research study area, recreation area, etc. is recorded. The agencies which provide information for inclusion in the Restricted Areas Book include: Alberta Agriculture, Food and Rural Development (AFRD), Community Development, ADOE, Alberta Environmental Protection (AEP), and the federal department of National Defense. The Mineral Mapping Section of ADOE regularly updates the Book and distributes the updates to the Mineral Access, Geology and Mapping and Minerals Tenure Sections of the ADOE, and to AEP's Land and Forest Services. In addition to items specified in the Restricted Areas Book, there are standard setbacks and other restrictions that apply to mineral tenure agreements. Formal Crown land reservations or protective notation applications which remove land from access or restrict access are referred to the Mineral Access, Geology and Mapping Branch of ADOE for possible inclusion in the Restricted Areas Book. Completion of an Integrated Resource Plan or the approval of a new policy which restricts access will also trigger an entry into the Restricted Areas Book.

The interdepartmental Crown Mineral Disposition Review Committee (CMDRC) reviews all proposed mineral rights disposition parcels to identify impacts or potential impacts on the environment. The Committee is chaired by AEP and is composed of members from six AEP divisions, as well as from AFRD, Community Development, Municipal Affairs, Transportation and Utilities, the EUB and ADOE. The Chair requests comments from members and appropriate agencies concerning various parcels and develops recommendations on whether the parcel should be offered for disposition or not. If the parcel is to be offered the committee must also decide whether it should be offered with or without restrictions. Committee members also make recommendations on surface restrictions (Table 2). As well, some agencies may provide information about possible access concerns, whether related to a specific request to post mineral rights or not.

There are three categories of access restrictions:

1. *Surface Access Is Not Permitted*: no surface access allowed on specific lands (e.g. Ecological Reserves, Provincial Parks.)
2. *Surface Access Is Subject To Specific Restrictions*: surface access is allowed but subject to restrictions such as timing constraints and special buffer zones (e.g. key habitat areas, Historical Resources Management Areas).

3. *Surface Access Has Yet To Be Determined*: a land management decision regarding surface access is pending (e.g. proposed Provincial Park).

The Committee does not conduct a detailed environmental assessment at this stage because the posting and disposition of mineral rights, in and of itself, does not entail an environmental impact. Furthermore, the exploration and development activities would have already been reviewed at the Integrated Resource Planning stage to determine whether such activities constitute an acceptable use of the public land base in a particular zone. The pertinent issue at the disposition stage is whether the posting is subject to IRP land-use restrictions, or any other access restrictions or prohibitions, and if so, whether specific conditions should be attached in addition to the operating guidelines specified in the IRP plan.

If an activity is prohibited or restricted, a party can still enter into a tenure agreement, but does so with the knowledge that access may be limited or not permitted. It is worthy to note that 75% of all tenure agreements expire as non-productive. Only some of the remaining agreements are drilled. New advances in technology may allow in certain instances, for directional or horizontal drilling from outside environmentally significant areas, thereby obviating the need for surface access within the sensitive area. When a gas well is drilled in a normal section (1 mile x 1 mile), only 0.4% of this area is subjected to surface disturbance with some additional minor disturbance for an access road and pipeline. The tenure agreement is issued with the relevant restrictions contained in addenda attached to and forming part of the tenure agreement. The restrictions are non-negotiable.

5.1.2 Privately Owned Mineral Rights

The acquisition of privately owned oil and gas tenure agreements is entirely between the owner and the interested party. The provincial government does not get involved. Negotiations usually result in a legally binding contract.

6. DRILLING

6.1 Surface Rights Acquisition

6.1.1 Public Lands Surface

Prior to undertaking any surface development, a company holding a minerals tenure agreement for public or Crown lands must first obtain a Mineral Surface Lease (MSL) and a License of Occupation if an access road is required. Road access is not always obtained under a License of Occupation. A company may apply for both the well site surface lease and the access road approval through the Mineral Surface Lease application. Alberta Environmental Protection (AEP) and Agricultural, Food and Rural Development (AFRD) have joint responsibility for management of public land in the White Area, (Public Lands Act R.S.A. 1980 C. P-30) and AEP has sole responsibility for land management in the Green Area. The Public Land Officers (AFRD) and the Forestry Officers (AEP) are the land managers within their designated areas and deal directly with individual companies in establishing the terms and conditions imposed under the MSL. The MSL includes guidelines to control activity and protect the environment and may, for example, stipulate requirements such as specified setbacks from rivers or nesting areas, or restricted access at specified times of the year (Table 2). A similar process is followed for pipeline right-of-ways, which result in a Pipeline Agreement issued through the Land Administration Division of AEP.

6.1.2 Private or Patented Lands Surface

For access private or patented lands, the company holding the mineral tenure agreement to those lands must negotiate a surface lease with the landowner or occupant. Should the company and landowner fail to reach agreement on a compensation issue, the company can apply to the Surface Rights Board, under the provisions of the Surface Rights Act (S.A. 1983, c. S-27.1) administered by AFRD, to obtain a right-of-entry order, but only after the well licence approval or pipeline permit has been issued by the

Alberta and Energy Utilities Board (EUB). The Surface Rights Act sets out the framework for the negotiation and hearing process. The Surface Rights Board may convene a hearing to determine compensation for access, damages and incidental costs.

In instances where the company and the landowner cannot agree on non-compensatory surface issues, the EUB may mediate between the parties. The EUB is prepared to assist in the mediation of issues such as location of the facility or access road, the preparation of the facility site, construction of the facility, and any other concerns regarding potential impacts of the proposed facility. The EUB may also become involved in mediating disputes between an applicant and an affected adjacent landowner but only in regard to non-compensatory issues. If mediation fails, the EUB may hold a hearing to decide the matter. Such a hearing would not encompass any outstanding compensation issues which must be settled or referred to the Surface Rights Board.

6.2 The Well Site

6.2.1 Licensing

Any company wishing to drill a well deeper than 150 meters (500 feet) or for the purpose of producing hydrocarbons must first obtain a well licence from the EUB (Table 2). The company must satisfy the EUB that it has the necessary rights to the minerals, to surface access, and is in compliance with all applicable EUB regulations.

Proposed locations are checked against a series of maps and databases which identify known public concerns or specific geographic sensitivities requiring special referrals or conditions. Any anticipated activity in a designated Restricted Development Area or an activity that crosses or is adjacent to a river, stream or other body of water, will automatically trigger a referral to AEP for their approval. In addition, this location check may further result in a referral to various public or environmental interest groups, if broader concerns have been identified. As in the case with a seismic program, a drilling program can be disallowed for environmental reasons, such as programs proposed for Zone 1 (Prime Protection) areas of the province. As explained in Section 4.1, Zone 1 development is not permitted unless the proposal constitutes a "step-out" application as provided for in the Eastern Slopes Policy.

For public land, the EUB generally accepts that all surface issues have been resolved through the MSL process and appropriate conditions have been placed on the MSL addressing any specific environmental concerns regarding the surface lease. For private land, the EUB well licensing process is the primary venue for dealing with environmental concerns raised by land owners, other government departments, local authorities, and special interest groups. Appropriate conditions may be attached to the well licence, or a licence may not be granted, for environmental reasons.

As part of the well licence application review, the EUB will frequently refer applications on private lands to its field offices as well as to the Land Reclamation Division (LRD) of AEP for their review and assessment. This review may include an on-site inspection by EUB or LRD field staff to determine whether development of the proposed site is consistent with sound conservation and reclamation practices and whether this development is acceptable from an overall environmental perspective.[2] Special measures may be imposed covering well-site or access road construction or operational measures. In cases where public concern, beyond that of the landowner, is anticipated or known, the EUB further requires that the company make its intentions publicly known as part of the well licensing process. Where mediation does not resolve identified concerns, the EUB may hold a hearing to decide the matter.

[2] General criteria used by the EUB Well Licencing Section when referring applications to EUB/LRD field staff include: (1) construction involving side-hill or top-hill cuts; (2) locations in sensitive land-use areas such as in or adjacent to urban centres and flood-irrigated land; (3) sensitive soil conditions such as permeable sand or gravel areas and muskeg that may be inappropriate to use for sump material and are difficult to reclaim; and (4) access road construction such as roads of considerable length, roads immediately adjacent to valley breaks and river valleys, and significant elevation differences across the road.

In addition to ensuring that the proposed well site and drilling program complies with all EUB requirements, the well licence process helps to identify applications which may have some level of public concern associated with them. The process initiates consultation and ensures consideration of the concern. The EUB reviews several thousand well licences each year. Very few of these, however, reach the stage where they must be considered at a hearing to decide on a disposition for the application. Twenty-eight well licence applications have been denied since 1975 following a formal public hearing process. Applicants that are unable to resolve public concerns pertaining to an environmental, or other issues, may choose to withdraw their licence application in lieu of risking a denial of the licence request following a hearing. A number of well licence applications have been denied on the grounds of negative environmental impacts or negative impacts on agricultural operations. Many other applications have been approved only after operators have agreed to amendments or conditions that would render the well site acceptable from an environmental, technical and social perspective.

6.2.2 Well Site Selection

The proximity of a well to bodies of water, topographical changes, urban centers, surface improvements (such as pipelines or domestic water supplies), airports of any kind, defined special archeological, environmental or historic areas, and other major features is reviewed to ensure that the well can be drilled with acceptable impacts. In addition, any potential impacts brought to the EUB's attention by the landowner or affected public are considered. These other considerations include potential impacts on the ability to conduct agricultural operations around the proposed site, the effect on wildlife habitat and migratory routes and the ability to reclaim the area once disturbed. The EUB strives to ensure that the well sites be located so that the impacts, during the life of the facility, are minimized and the site can be reclaimed to a state that leaves no appreciable or ongoing impact.

In certain areas where intensive surface development is associated with petroleum activity, a conservation and reclamation approval must be obtained from AEP. Generally this occurs in areas of heavy oil production if the combined surface lease area exceeds 5.7 hectares per quarter section.

6.2.3 Casing and Cementing Program

The EUB has well-defined requirements for casing and cementing program design (Table 2). Requirements include safety factors for tension, burst, collapse, and hydrogen sulphide resistance of the pipe. The EUB regulates the required conductor and surface casing, setting depth and cementing requirements for blowout control and protection of shallow freshwater aquifers.

6.2.4 Hydrogen Sulphide Review

Based on a proposed well's potential hydrogen sulphide release rate, the EUB requires the applicant to demonstrate that the proposed well site complies with minimum required setback distances from existing dwellings, subdivisions, public facilities and urban centers (Table 2). Where the proposed well is classified as a "critical sour well" or where there are any residents within the calculated planning zone, the operator must submit to the EUB a drilling plan which includes an emergency response plan as part of the well licence application. The emergency response plan must be communicated to the potentially affected residents by the operator.

This review determines whether the proposed location is in compliance with minimum setback distances required between the various classes of proposed sour gas facilities and existing dwellings, subdivisions, public facilities and urban centers.

6.2.5 Drilling Waste Disposal Requirements

The EUB requires that waste resulting from the well drilling process be handled and disposed of

in a specified manner (Table 2). Waste types and additives proposed for use and known to have significant adverse environmental impacts if not disposed of appropriately, require the submission of a disposal plan as part of the well licence application. The EUB policy, developed jointly with AEP, AFRD and industry, specifies the appropriate disposal options for routine wastes and requires that the operator submit disposal plans prior to the generation of any non-routine wastes. By requiring that the operators address waste fluid disposal before starting drilling, the environmental implications of using various drilling systems and additives are thereby incorporated into the operator's decision-making process. The result is an incentive to utilize more environmentally benign drilling systems. The policy is administered by the EUB for private land and by AEP and AFRD for public land.

6.2.6 Surveillance and Compliance

Once the well licence has been granted, the EUB conducts inspections of drilling operations to ensure compliance with the licence, regulations, inspection manual, and industry recommended practices. The EUB focuses on those drilling operations which have accrued a poor licence history, are situated in high profile areas, involve sour wells, have a poor contractor history, or which involve some environmental sensitivity. In 1994, 648 drilling rig inspections occurred, resulting in 72 shut-downs of drilling operations due to non-compliance (Figure 4).

Inspections by AEP and AFRD are also conducted to ensure compliance with conservation and reclamation guidelines. In 1993, 4,946 well-sites were inspected.

FIGURE 4
DRILLING RIG INSPECTIONS (1994)

7. PRODUCTION AND PROCESSING FACILITIES

7.1 General Requirements

Gas wells in Alberta range from low pressure wells producing only a few hundred cubic feet of gas a day, to high pressure gas wells producing more than 50 million cubic feet of gas per day. The production streams contain varying amounts of water, hydrogen sulphide, and natural gas liquids. Therefore, the facilities constructed to handle and process this production can vary from a simple sweet gas single-well battery to a complex field gate system handling sour production from hundreds of wells. Regardless of size, a production facility is generally designed to separate the production into components which can be measured, transported and sold or disposed of separately while providing the operator the ability to allocate the total production to individual wells for reservoir engineering, production engineering and equity purposes. Emphasis is also placed on ensuring that the facilities are designed, built and operated to ensure protection of the environment, protection of public health and safety and the safety of workers.

In accordance with the Oil and Gas Conservation Regulations, production facilities must be approved by the Alberta Energy and Utilities Board (EUB) prior to construction (Table 2). Any proposed modifications to an existing facility, where such a modification will affect the measurement aspects or the environmental impacts, requires further approval.

The information required for submission to the EUB in support of an application to construct or modify a production facility, and the scope of the EUB's technical and environmental review depend upon the size and type of operation, the location, and the general complexity of the facility. The larger the facility, and the attendant social and environmental impacts, the more rigorous the information requirements and review process imposed by the regulator. Larger facilities may also require the filing of a formal Environmental Impact Assessment (EIA) Report with Alberta Environmental Protection (AEP).

The EUB application review process generally includes a review of the following factors, depending on the size and nature of the facility: need for the facility, site selection, anticipated surface impacts, ability to reclaim the site, liquids control and containment, air quality control, sulphur recovery, public safety procedures, public involvement processes, waste management, and noise control.

Small facilities that are likely to have minimal environmental impacts are usually subject to an internal EUB review. Larger facilities involve a process wherein the public is given a number of opportunities to express their concerns. This broader review analyzes the environmental impacts in greater detail and involves referrals to other agencies, primarily AEP.

The EUB requires that all operating companies discuss their projects with individuals in the local area who may be affected or have expressed some concern about the proposed project. Obviously, the larger the project, the broader the required notification. The EUB requires that potentially affected local residents and the general public have an opportunity to discuss concerns with the company before the matter is reviewed by the EUB. For larger projects, which require an EIA report, the public also has an opportunity to become involved in the AEP process. If concerns have not been addressed to the satisfaction of the local, potentially affected individuals, the companies or the general public, the EUB may attempt to mediate the outstanding issues or hold a public hearing to resolve the matter.

The EUB has the right to request additional environmental information from the applicant, beyond that contained in the EIA report, if this information is germane to the EUB's review of the application, regardless of whether this review is conducted as a public hearing or an internal review.

7.2 Need

A facility application may be reviewed by the EUB to determine the need for the facility and assess

whether the opportunity exists to use currently available excess capacity, which can be practically accessed, in the area. It is not uncommon for existing facility operators to intervene in proceedings to argue that the gas should be processed at their facility or that their existing facility be expanded rather than approve a new facility.

7.3 Site Selection

In regard to site selection, an application is reviewed to ensure that either a consent or a statement of no objection has been obtained from the landowner, in the case of freehold or patented lands, or that an Mineral Surface Lease (MSL) has been obtained from the appropriate Land Administration Division of AEP in the case of Crown lands. On Crown lands, the EUB accepts that the Crown land manager has addressed all of the concerns associated with a given site and has attached appropriate conditions to the MSL (or miscellaneous surface lease, if applicable) to mitigate impacts prior to its issuance. On patented lands, the landowner has an opportunity to address his concerns in the EUB application process. The EUB also ensures compliance with the environmental and setback regulations. Adjacent residents also have an opportunity to raise their concerns with the applicant and the EUB. As with well sites, the EUB may involve itself in mediating the dispute. If this does not prove satisfactory, the EUB may convene a hearing. EUB field staff may visit the site and provide an analysis of the suitability of the site as part of the EUB's internal review process.

For larger facility applications such as gas plants and larger pipelines, in addition to obtaining consent of the landowner (surface lease), or the Crown land manager (Mineral Surface Lease), the applicant must also file an application with AEP and obtain a conservation and reclamation approval. These applications are referred internally to the Land Reclamation Division of AEP to address site suitability from a reclamation and soils handling perspective.

7.4 Liquids Control

The internal EUB review process ensures a design which allows for control and containment of all liquids, including proper site preparation to protect groundwater contamination, dyking and relief tankage in the event of spillage or equipment failure, and adequate surface run-off control (Table 2). The EUB requires all operators which produce liquids to be members of the area Oil Spill Co-operative, which provides training and equipment to address liquids spills. Alternatively, the operator can file individual company or facility contingency plans. Liquids control matters associated with larger facility applications are referred to AEP. The applicant is required to submit sufficient information to satisfy AEP's review of liquids handling requirements. AEP then issues an approval pursuant to EPEA which specifies liquids handling requirements.

7.5 Air Quality Control

Both AEP and EUB review the approval application to ensure that air emissions are controlled adequately. For sour gas plants, the EUB focuses on application of appropriate sulfur recovery technology and AEP focuses on flare or incinerator stack design. Both ensure that Alberta's Ambient Air Quality Guidelines are met on a design basis.

The potential for nuisance odors is also assessed. Where the potential for nuisance odors or air quality exceedances exists due to fugitive emissions of tank vapors, recovery of vapors would be required for those facilities.

In Alberta, all sour gas plants (plants which remove H2S from the raw gas stream) are required to obtain an approval under the Environmental Protection and Enhancement Act (EPEA). For sweet gas plants, any facility with total nitrogen oxides emissions of more than 16 kilograms per hour must also obtain an EPEA approval.

The EUB sets and administers minimum required sulphur recovery levels for sour gas processing plants (IL88-13, ERCB and AEP, 1988). The sul-

TABLE 4
PREVIOUS AND CURRENT SULPHUR RECOVERY REQUIREMENTS
FOR NEW GAS PLANTS IN ALBERTA (ERCB 1988)

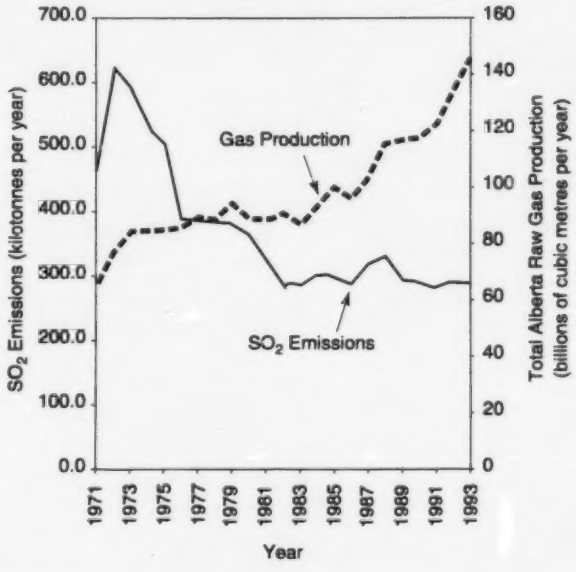
Plant Size (Input Metric Tonnes of Sulphur per day)	*Previous Recovery Rate (%) Pre-1988*	*New Recovery Rate (%) Post-1988*
1 to 5	nil	70
5 to 10	nil	90
10 to 50	92 to 96	96.2
50 to 2000	96.2 to 98.8	98.5 to 98.8
More than 2000	99	99.8

phur recovery level depends on the size of plant — in terms of sulphur inlet and on the practical sulphur recovery technology available. The sulphur recovery guidelines for gas plants in Alberta were last revised in 1988 (ERCB and AEP, 1988, Table 4). These guidelines apply to all sour gas plants built since 1988 and to plants built prior to 1988 when "*...a capacity expansion of greater than 25% or a substantial process modification is made...or when substantial new sour gas volumes which were not connected to an existing plant....and further, when substantial new sour gas volumes which were not recognized in the original plant approval, are connected to an existing plant, the new sulfur recovery requirements will be imposed*" (ERCB and AEP, 1988). Figure 5 shows that the total Alberta SO_2 emissions from sour gas processing plants has declined since 1972, and since 1981 have generally flattened out, in spite of rising volumes of gas being processed.

Adequate dispersion, as predicted by dispersion modeling, of SO_2 remaining in the tail gas to meet Alberta's Ambient Air Quality Guidelines, is ensured by compliance with maximum permitted SO_2 emission rates prescribed in AEP operating licences.

Facilities which do not have a continuous flare as part of the design but which require flaring when the well is being tested or cleaned after servicing, must comply with EUB regulations. If the volume of natural gas proposed to be flared or the concentration of hydrogen sulphide is more than allowed in the regulation, the operator must apply to the EUB for approval. This ensures that temporary flares are designed and operated in a safe and environmentally acceptable manner.

FIGURE 5
ALBERTA SO_2 EMISSIONS AND RAW GAS PRODUCTION (EUB, 1994)



7.6 Clean Air Strategic Alliance

In 1994, the Clean Air Strategic Alliance (CASA) was struck, bringing together industry, government and non-governmental organizations to manage air quality issues in Alberta. CASA (CASA, 1991) developed a vision of clean air that stated....*"The air will be odourless, tasteless, look clear and have no measurable short- or long-term adverse effects on people, animals or the environment."*

CASA has four formal objectives:

- to plan for, organize and commit resources in support of the vision;
- to operate the Comprehensive Air Quality Management System;
- to conduct strategic air quality planning for Alberta through shared responsibility and the use of a consensus-building collaborative approach; and
- to prioritize air quality problems in Alberta and identify specific actions or action plans and activities to resolve them.

Developing the comprehensive air quality management system was achieved through the formation of a senior-level CASA Board of Directors. This Board is incorporated under the Societies Act and given a mandate by the Province of Alberta. The Board consists of representatives from 18 different stakeholder groups (eight industry, four environmental non-governmental groups, and six government). Alliance values include: consensus decision making, focus on solutions, respect and recognition of different perspectives, sustainable development, accountability for decisions, and move from win/lose to win/win decisions. Over 20 stakeholder groups are currently working on a variety of CASA priorities (CASA, 1994). The CASA process builds upon the regulatory framework in Alberta, and is exploring new, innovative mechanisms to manage air quality in the province. One such effort, the SO_2 Management Working Group, is exploring such methods for all sources of SO_2 emissions in the province.

7.7 Emergency Procedures Plans

Operators of facilities which process sour natural gas (gas which contains more than 0.01% hydrogen sulphide) are required by the EUB to submit and maintain emergency plans which address how the operator would ensure the safety of surrounding residents, including evacuation procedures if necessary, in the case of a release of sour gas. The area of the emergency plan is determined by the worst-case, potential release rate of gas and the concentration of hydrogen sulphide.

7.8 Waste Management and Disposal

The EUB's regulations outline appropriate waste management practices for the upstream petroleum industry. These regulations address all the usual waste streams associated with production facilities. Oil field wastes must be handled and stored in an appropriate manner so as not to cause a hazard to the environment, worker safety, or the public. Approved disposal methods for the various waste streams are contained in these regulations. Where possible, the disposal option of choice is to have the waste processed at an EUB-approved oil field waste processor where the waste is separated into its constituent parts, the hydrocarbon fraction salvaged for sale and the remaining fractions properly treated and disposed. The EUB licenses and regulates the development and operation of waste disposal wells, which is the common method of disposing of production waters. Waste that cannot be safely or adequately handled by the oil field waste processors must be disposed at facilities with more appropriate or sophisticated technologies, such as Alberta's hazardous waste processing facility in Swan Hills.

7.9 Noise Control

The EUB has a guideline which specifies the acceptable level of noise that can be emitted from any natural gas facility. Applicants are expected to determine anticipated noise levels and ensure that the proposed design meets the ambient noise standard.

7.10 Environmental Impact Assessment Process

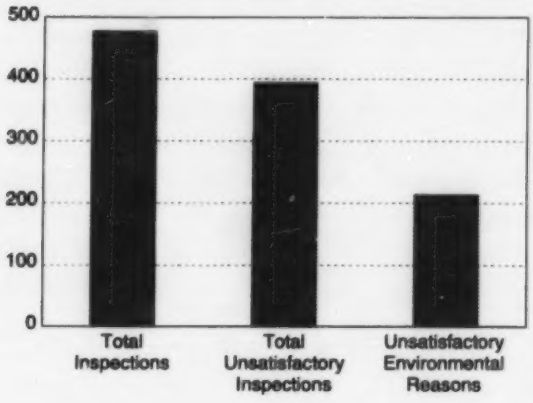
Sour gas processing facilities and any other facilities that fall within the EPEA mandatory activities list or which are otherwise subject to an environmental assessment by order of the Director or the

Minister of Environmental Protection must submit an EIA report with their application. This EIA report forms part of the application before the EUB.

7.11 Surveillance and Compliance

In 1994, a total of 475 gas surveillance inspections were undertaken, as well as 83 re-inspections of unsatisfactory facilities (Figure 6). These inspections consisted of 188 gas plant inspections and 287 gathering system inspections. The total number of unsatisfactory occurrences in 1994 was 392, some 90% of which were considered to be minor.

FIGURE 6
EUB INSPECTIONS OF GAS FACILITIES (1994)



Measurement deficiencies accounted for 22% of unsatisfactory occurrences, equipment deficiencies accounted for 23% and environmental deficiencies accounted for 54%. Environmental deficiencies were primarily spills on and off-lease, inadequate dikes, excessive liquids carryover into flare pits, emission exceedances, and inadequate general housekeeping matters. These unsatisfactory occurrences resulted in the operators of these facilities being ordered to undertake mitigative measures. In 1994, seven facilities had operations suspended until compliance was achieved.

8. GATHERING, TRANSMISSION AND DISTRIBUTION

8.1 General Requirements

The Pipeline Act (R.S.A. 1980, c. P-8) provides the legislative authority for a comprehensive regulatory framework, addressing construction and operation of pipelines for petroleum purposes. The Pipeline Act provides that no party shall build or operate a pipeline in Alberta unless a permit is obtained from the Alberta Energy and Utilities Board (EUB), or the National Energy Board, in the case of a federally regulated pipeline

8.1.1 Site Selection

As with other facilities, a distinction is made based on whether the proposed pipeline will cross Crown or patented lands. Pipeline applications, by their nature, usually involve a number of landowners or land managers. Applications are reviewed to determine that notice has been given, or consent obtained from the landowners or the land manager, in the case of Crown lands. On Crown lands, the operator requires an approval from the Land Administration Division of Alberta Environmental Protection (AEP). In the White Area, applications are also referred to Agriculture, Food and Rural Development (AFRD) for a review of environmental concerns and the application of any conditions. The EUB expects that the public land manager has addressed all surface issues in negotiating the pipeline application, and has included the appropriate conditions in the pipeline agreement. In the case of patented lands, the EUB may become involved in mediating disputes between the parties and, failing resolution, may hold a public hearing on the matter. Since matters of compensation are outside of EUB jurisdiction, the operator and landowner(s) must settle compensation disputes or take the matter to the Surface Rights Board for arbitration.

8.1.2 Technical Issues

The technical requirements for design, construction, operation and maintenance of a pipeline are outlined in the EUB regulations and in the appropriate Canadian Standards Association (CSA) standards for pipelines used to transport natural gas and natural gas products. The EUB approval process ensures compliance with these standards.

8.1.3 Referral Process

The greater the diameter and the length of the proposed pipeline — which could lead to an increased potential for environmental impacts — the more rigorous the application information requirements and review process. A decision is made based on an index calculated by multiplying the outside diameter of the pipeline (millimeters) by the length of the proposed pipeline (kilometers). If this index is 2690 or greater, it is considered a Class I pipeline and subject to more detailed scrutiny than small or Class II pipelines, which have an index value less than 2690. Similar to well licence applications, pipeline permit applications are compared to in-house databases which identify environmentally sensitive areas or areas in which there is known public concern.

8.1.4 Emergency Procedures Plans

All pipelines that transmit sour gas and high vapor pressure liquid gas co-products must have an approved emergency procedures manual filed with the EUB. This manual must be updated as required to remain current.

8.1.5 Corrosion and Leak Prevention

Pipeline operators are required to address the corrosion potential which may exist as a result of the operation of a pipeline and therefore must develop a corrosion mitigation program and document a leak prevention and detection program for the pipeline.

8.2 Conservation and Reclamation Requirements

8.2.1 Class II (less than 2690) Pipelines

These lines consist primarily of field gathering systems into a processing facility using small diameter pipe over relatively short distances. This application review process is essentially carried out internally within the EUB. All pipelines, regardless of length or outside diameter, are required to be designed and constructed with regard for environmental management and reclamation planning under EPEA and must adhere to Environmental Protection Guidelines developed jointly with industry and public stakeholders. Before an application to build a new pipeline is filed with the EUB, the proponent must contact the local Reclamation Inspector, as well as any other affected parties, to discuss the project and resolve any outstanding environmental or land-related issues. The results of these discussions are incorporated into the permit application before the EUB. In certain instances, the EUB and the Reclamation Inspector may choose to visit the site with the proponent to discuss route, alternative routes, soils handling, reclamation procedures, and other relevant environmental mitigative measures. In addition, when water crossings are encountered, the applicant is required to obtain a Water Crossing Permit from AEP. In many cases, crossing a creek or river may only occur in certain months of the year to minimize environmental impacts. If the pipeline is located in a Restricted Development Area, Ministerial Consent is required from AEP.

8.2.2 Class I (equal to or larger than 2690) Pipelines

The planning and communication process for Class I pipelines is the same as Class II. In addition, these pipeline projects require a formal application to AEP describing in detail the mitigative measures to be taken to reduce environmental impacts. In most cases, the Conservation and Reclamation application consists of detailed information on soils, soils handling, vegetation, re-seeding, clearing, reclamation

planning, right-of-way width, routing and alternative routing, wildlife management, and other relevant environmental impacts.

While the EUB review addresses technical, routing, environmental, public interest and landowner consent matters, a Conservation and Reclamation application is submitted by the applicant to AEP, which reviews it with other affected government departments. The Conservation and Reclamation application is advertised to allow directly affected parties the opportunity to submit statements of concern to the Director of Environmental Assessment.

When all matters, including any objections, are resolved to the EUB's satisfaction (through negotiation, mediation or a decision following a public hearing), the EUB may grant a permit to construct the pipeline. AEP will also issue the appropriate Conservation and Reclamation approval when it is satisfied that its requirements are met.

For pipeline projects where the potential environmental impact is very significant, the project may be screened by AEP to determine whether the project should be subject to consideration under the environmental assessment process. Should the project undergo an EUB hearing, the EIA is undertaken prior to the hearing and the report forms part of the application reviewed by the EUB.

8.3 Surveillance and Compliance

The EUB's compliance philosophy, as described for production facilities, is applied equally to pipeline facilities. The EUB conducts inspections of pipelines and related facilities to ensure compliance with all requirements. Any complaints from the public are addressed with the operator.

In 1994, the EUB conducted 671 construction and testing inspections and 85 operational audits. Of these, approximately 31% of the construction and testing inspections were unsatisfactory, while 47% of the operational audits were unsatisfactory. Standards were enforced and follow-up inspections were made to ensure that corrections were properly implemented. This seemingly high percentage of unsatisfactory inspections is primarily the result of the EUB targeting its inspection efforts on those pipelines that have a higher potential for problems, either due to their age, design, or the nature of their service. Inspections by AEP and AFRD are also conducted to ensure compliance with conservation and reclamation requirements. In 1993, 2,827 pipelines were inspected.

9. SUSPENSION, ABANDONMENT, DECOMMISSIONING AND RECLAMATION

All inactive wells, pipelines, or facilities must be properly suspended to ensure that the site is secure until steps are taken for its decommissioning. This proper suspension of operations will also limit the future abandonment liability. The Alberta Energy and Utilities Board (EUB) requires immediate decommissioning or upgrading of a well or facility if it poses an environmental or safety hazard.

Although the terms "abandonment" and "decommissioning" are often used interchangeably, they have distinct regulatory meaning. Abandonment usually refers to the plugging and capping of a well or the purging and capping of a pipeline. Decommissioning usually refers to the associated facility and is generally a three-step process consisting of dismantling, decontamination and reclamation. Dismantling includes the removal of all surface equipment, buildings, and the abandonment of any wellbores and pipelines. It also usually involves the removal of all salvageable material. This may also include gravel, pipe in the ground, and any liquids in pits or tanks. Decontamination, involves clean-up, removal, neutralization, or any other such action which would render any surface or subsurface contamination harmless or of very low risk to the environment. The final step is reclamation which involves returning the disturbed site to the land, soil and vegetation criteria established by Alberta Environmental Protection (AEP). The EUB typically administers the dismantling under the Oil and Gas Conservation Act (R.S.A. 1980, c. O-5) and the Pipeline Act (R.S.A. 1980 c. P-8) AEP administers the reclamation process in accordance with the provisions of Environmental Protection and Enhancement Act (EPEA).

Reclamation criteria for well sites and associated facilities have been developed by the AEP and Agriculture, Food and Rural Development (AFRD) based on their 30 years of experience in well site certification and with significant input from industry and other major stakeholders. The fundamental principle embodied in the criteria is that any changes to land capability caused by project activities should be measured against the original or representative off-site capability, with due consideration for construction norms at the time of development.

Prior to reclamation certification, drilling wastes and other oil field wastes must be properly disposed of according to EUB guidelines, and all contamination must be treated. Specific criteria for the assessment and remediation of contaminants (e.g., salts, metals, sterilants, organic chemicals) are provided by AEP. While the certification criteria apply to well site leases, access roads, and off-site borrow pits, sumps and campsites, it does not apply to facilities or features that are left in place with the landowner's approval, although these facilities are covered by the reclamation certificate. Such facilities must not cause off-site damage nor constitute a safety hazard. The reclamation certificate will be delayed until off-site damage is repaired.

9.1 Well Abandonment

All wells will eventually need to be abandoned. The decision to abandon a well has historically rested with the company. However, as noted above, the EUB is becoming proactive in requiring the abandonment rather than just the suspension of wells. The oil and gas industry must apply to the EUB for approval to either suspend or abandon a well. The EUB approves open and cased-hole abandonments subject to the applicant meeting specified conditions or requirements. These include covering or isolating known or potential hydrocarbon and ground water zones in the well with cement or bridge plugs to prevent communication and potential contamination between zones. The wellhead is then removed and the casing strings are cut off a minimum of one meter below ground level. Steel caps are then welded onto the casing strings to prevent surface material or fluids from entering the well. In areas where there is the potential for surface development, the casing strings may

be cut off deeper than one meter to prevent construction damage to the well bore. After the well has been abandoned and all surface facilities dismantled, AEP administers the decontamination and reclamation phases of the decommissioning. The company must obtain a reclamation certificate upon satisfactory completion of these phases.

9.2 Facility Abandonment

There are at present no regulations requiring a company to apply to the EUB for approval to suspend an inactive facility or to dismantle (abandon) a facility if it poses no safety or environmental hazard. The EUB is currently reviewing both of these areas to develop processes and requirements that are consistent with those created for wells. Criteria for suspension of an inactive facility have been drafted. As previously discussed, once the facility has been dismantled, AEP administers the decontamination and reclamation of the site. A reclamation certificate must be obtained following abandonment.

9.3 Pipeline Abandonment

Similar to the abandonment procedure for wells, the Pipeline Act and regulations require an application to the EUB for approval to discontinue (suspend) or permanently deactivate (abandon) a pipeline. The EUB approves these applications subject to specific terms or conditions. In the case of a discontinued pipeline, it must be left in a safe condition by removing the contents of the pipeline by purging with air, an inert gas, or displacing with fresh water and a corrosion inhibitor. Additionally, cathodic protection of the pipeline must be maintained. The permanent deactivation of a pipeline requires the removal of the contents of the pipeline as previously discussed and the removal of all associated surface equipment and installations. The ends of the pipeline must also be cut off and capped below ground level. This ensures that the pipeline is isolated and prevents possible soil/groundwater contamination by the original contents of the pipeline. Any decontamination and reclamation activities are again administered by AEP. A reclamation certificate must be obtained following abandonment.

9.4 Orphan (Neglected) Wells

The government and the oil and gas industry jointly recognize the need to ensure that the licensee of a well and its partners remain responsible throughout the life of the well, particularly to ensure timely abandonment, thereby avoiding orphan wells and their associated liabilities. To this end, the oil and gas industry agreed to a restricted well abandonment fund that would pay for the downhole abandonment of wells if no responsible party could be located. Discussions are under way to have the fund extended to cover decontamination and reclamation of orphan well sites. The fund is maintained through an annual levy on all inactive wells and first-time well licensees.

To ensure that a credible entity maintains responsibility, activities related to approval of new well licensing, transfers, suspensions, and abandonments are all performed by EUB corporate surveillance and enforcement. In assuming the responsibility for maintaining the well abandonment fund, the oil and gas industry sought assurance from the EUB that EUB processes would prevent or limit future orphan wells. As a result, new requirements for well licensing, transfer, and suspension have been developed.

10. EMERGING AREAS OF ENVIRONMENTAL CONCERN

Two emerging areas of environmental interest are greenhouse gas emissions and cumulative effects. The greenhouse gas issue gained prominence as the international community began to address the prospect of global warming or climate change. The issue of cumulative effects is another emerging consideration in areas where there is ongoing development of natural resources.

10.1 Greenhouse Gas Emissions

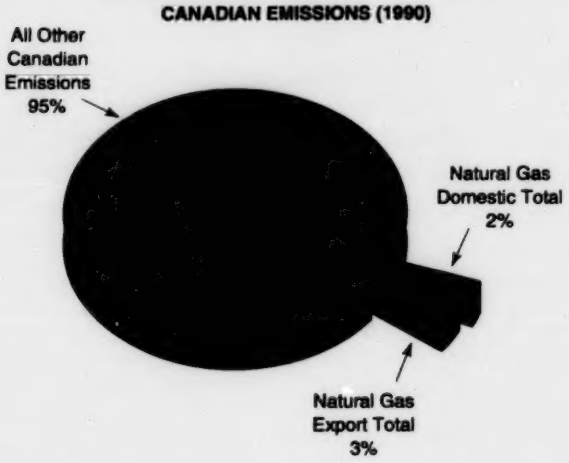
Most jurisdictions around the world, including Alberta, do not directly regulate the two main greenhouse gases (carbon dioxide and methane). The control of the greenhouse gas nitrous oxide (N2O) is achieved by regulating all oxides of nitrogen through federal and provincial guidelines (Canadian Council of Ministers of the Environment — CCME, 1992, Alberta Energy and Utilities Board — EUB, 1988, and Environment Canada, 1993). Halocarbons (CFCs) are controlled at the federal level through binding international agreements. The Environmental Protection and Enhancement Act contains a regulation governing the production and use of ozone-depleting substances in Alberta (AR 125/93, Alberta Environmental Protection, 1993).

In 1992, the Alberta government committed to moving toward reduction of greenhouse gas emissions from current levels. The federal government developed a goal of ...."stabilizing emissions of carbon dioxide and other greenhouse gases, not covered by the Montreal Protocol, at 1990 levels by the year 2000." Under the consensus-based Clean Air Strategic Alliance (CASA) approach, one of the first tasks was to develop *"Principles and Recommendations for The Alberta Climate Change Action Plan"*, which was subsequently used in national climate change negotiations. The Action Plan stresses principles of shared responsibility, maximum flexibility, comprehensiveness, integrated approach, equity, prosperity, precautionary (but no regrets) global perspective, partnerships and sustainability. This early start to dealing with the climate change issue stresses cost-effective actions that will not put Alberta ahead of similar actions by its international trading partners.

Under Canada's National Action Program on Climate Change, recently tabled at the Berlin Framework Convention on Climate Change, a national Voluntary Challenge and Registry (VCR) Program has been developed to gain reductions in greenhouse gas emissions. The Canadian Association of Petroleum Producers (CAPP) has encouraged its participating members to develop and submit action plans to the VCR. CAPP has produced a Climate Change Voluntary Challenge Guide, along with Guiding Principles and technical and conversion tables to assist members in participating in and reporting to the VCR. CAPP will continue to encourage its members to voluntarily reduce their net emissions of greenhouse gases per unit of production. Participation from this sector is expected to increase.

It is important to note that while petroleum-producing companies can take actions to reduce greenhouse gas emissions per unit of their production, these companies and their competitors around the world produce petroleum to satisfy consumer demand. Both Canadian and global demand for petroleum and related products are expected to rise substantially through the year 2000. Total absolute CO_2 emissions from the Canadian energy sector will likely increase from 1992 levels of 450 MT to 547 MT in 2000 (NEB, 1994). The increased emissions are expected to result from the Canadian industry supplying a growing U.S. demand for Canadian natural gas (2.598 Bcf in 1993/94 to 3.042 Bcf in 2000, NRCan, 1995). However, from a Canadian perspective, CO_2 emissions related to natural gas processing for gas exports to the U.S are small (Figure 7). Additionally, these exports to the U.S. are expected to displace more carbon intensive fuels and thus help to reduce greenhouse gas emissions globally and improve air quality (e.g. SOx) in the U.S. It is also anticipated that voluntary measures may bring down CO_2 emission projections for the year 2000.

FIGURE 7
CO_2 EMISSIONS RELATED TO NATURAL GAS PRODUCTION, PROCESSING, TRANSMISSION AND DISTRIBUTION FOR U.S. EXPORTS AND DOMESTIC USE COMPARED TO ALL OTHER CANADIAN EMISSIONS (1990)



To date, CAPP members had reported successes which have resulted in site-specific reduction or prevention of greenhouse gas emissions of approximately 3.62 million tonnes of CO_2 equivalent (CAPP, 1995c). The emissions reduced or prevented as a result of CAPP members' actions are expected to continue to grow over the next year as members improve their action plans and identify new opportunities.

Approximately 70 of CAPP's 190 members have committed to participating in the VCR. These 70 CAPP members produce about 85% of Canada's oil and gas. By mid-October 1995, 50 of these 70 committed companies had filed action plans with the VCR (Alberta Government, 1995d). The plans submitted by CAPP members generally outline the submitter's approach to participation, its successes to date, and its plans to reduce emissions further.

The success stories and action plans of CAPP's participating members indicate that oil and gas industry efforts in reducing greenhouse gases have focused on five main areas: energy efficiency; methane gas capture; acid gas injection; cogeneration; and other miscellaneous actions. The first two categories appear to have the greatest potential for greenhouse gas emission reductions. CAPP and its participating members will be taking steps over the next year to establish appropriate performance indicators to assist in measuring energy efficiency gains and to gauge other emission reduction improvements.

The Alberta government has developed its own Action Plan to voluntarily reduce greenhouse gas emissions from its own operations (Alberta Government, 1995c). The three main thrusts of this plan will be reduction of energy used in government buildings (to ensure maximum energy efficiency by finding ways to reduce natural gas and electricity consumption), reduced emissions in government fleet vehicles, and reduced waste in office buildings and other government operations.

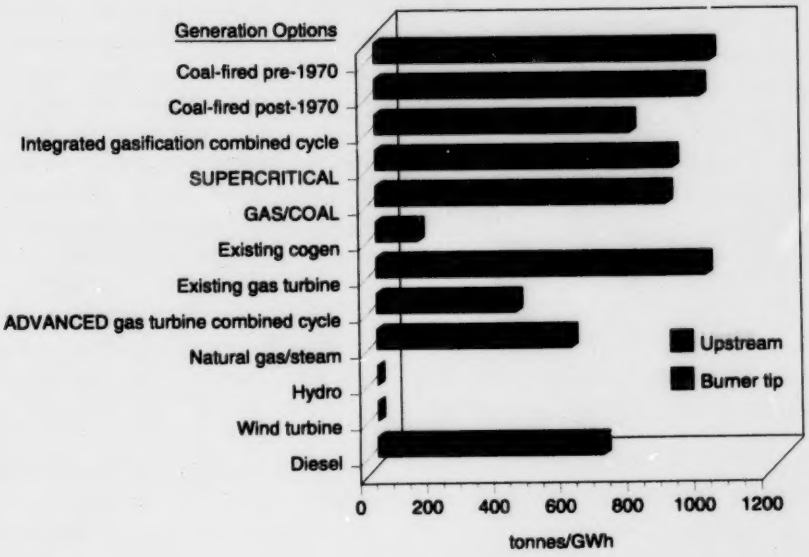
On a full fuel cycle basis[3], state-of-the-art, advanced gas turbines and cogeneration facilities have one of the lowest greenhouse gas emission profiles when compared to other fossil fuels (Full Fuel Cycle Consortium, 1995, Figure 8).

10.2 Cumulative Effects

While individual projects for the exploration and development of natural gas reserves typically have slight or mitigatable environmental impacts. These impacts may increase in significance when intense development and/or other man-made disturbances occurs within an environmentally sensitive area. However, it is also true that gas development in Alberta is a dynamic process in which older wells are abandoned and reclaimed, as new ones are drilled and developed. As natural gas development continues in Alberta, the cumulative impact of such development on the environment bears further review and assessment. EUB Information Letter 93-9 requests

[3] Full fuel cycle in this context was defined as ... "an emissions profile for a specific generation facility that includes all aspects of the fuel or energy gathering stages through to the utilization stage (but did not include construction or manufacturing related emissions)"

FIGURE 8
FULL FUEL CYCLE CO_2 EMISSIONS



that applicants proposing oil and gas development in the Eastern Slopes (Southern Region) area of Alberta file a thorough environmental assessment that includes:

> "a description and analysis of the significance of environmental, economic, and cultural impacts including regional, temporal, and cumulative effects."

At this time, the methodology and standards for cumulative effects studies continue to be improved and refined. The EUB has sponsored a study to examine cumulative effects methodologies and how they may best be incorporated by proponents into the EUB's application processes (Hegmann and Yarranton, 1995). The EUB has followed up this study in the fall of 1995 through dialogue with other levels of government, with industry and with environmental advocacy groups. In 1996, the EUB plans, in cooperation with AEP, to provide guidelines to industry which set out how applicants should address the cumulative environmental effects of their proposals.

11. CONCLUSION

The foregoing has been an overview of Alberta's comprehensive regulatory regime pertaining to environmental considerations in resource development. The key legislative enactments, primarily EPEA and the Energy Resources Conservation Act, and the administrative bodies responsible for approvals and enforcement, ensure appropriate depth and breadth in environmental review and assessment processes. Furthermore, Alberta's comprehensive regulatory regime provides a reasonable balance between economic and environmental objectives with a view to sustainable energy development and long-term optimal use of provincial lands and resources.

The environment is an integral consideration in energy development, and therefore provincial regulation encourages public consultation from the earliest stages of development. EPEA was the culmination of lengthy stakeholder consultations which resulted in the streamlining of nine statutes into one environmental act. The act clearly outlines the applicable environmental considerations for a project and simplifies the compliance burden with its one-approval process. The EPEA approval however covers the entire life span of a project from inception through to decommissioning. The EUB is charged with ensuring that energy development is carried out in an orderly and efficient manner which is in the public interest. The environmental, social and economic effects of a proposed development must be considered by the Board. The Board encourages public consultation and mediation of differences, and in appropriate circumstances will convene a hearing.

The responsibility for regulating energy industry activities is shared by EUB, ADOE, AEP and AFRD. All rely upon comprehensive legislation and procedures which ensure the orderly management and environmentally sensitive development of Alberta's energy reserves. Alberta's regulatory regime is subject to ongoing review and change to ensure that it continues to enable an appropriate balance between economic and environmental objectives in the public interest. These reviews are conducted through extensive consultations with industry, the general public and environmental non-governmental groups.

The natural gas regulatory system in Alberta is characterized by:

- being strongly consultative (which provides for an early identification of land-use conflicts and generally avoids litigations),
- provides clarity of rules and expectations throughout the development cycle (exploration to reclamation) which allows industry to use their innovation to comply,
- the regulatory framework is comprehensive and rigorous, but is currently undergoing review to ensure there is no duplication and that all regulations are still needed,
- ensures a reasonable balance between economic and environmental objectives (with a view to sustainable energy development)
- EUB and AEP inspectors are active in monitoring field operations and ensure compliance with conditions of approval and other regulatory requirements.

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